Further testing of the temporal stability of stated WTP

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Outline presentation

- Main objective
- Background CV studies
- Statistical testing procedures
- Results
- Conclusions & recommendations

Main objective

- Test the temporal stability of stated WTP responses over a 5 year period
- Previous studies find stable results over a short period ranging from 2 weeks to 2 years (McConnell et al., 1998)
- In practice, benefits transfer using 5 year or even older studies not unusual

Background CV studies

- Flood control policy in the Norfolk Broads, UK
- Protection of 30,000 ha freshwater wetland habitat and recreational amenities
- 210 km reinforced river embankments
- Dichotomous choice model
- General taxation
- 2,500-3,100 random next to pass visitors to the area
- Summer of 1991 and 1996
- Response rates 78 and 68%
- Non-usable response < 5%

Table 1. Summary Statistics of Respondent Characteristics

Respondent Characteristic	1991	1996
Average age	47	48
Average real household income level (£1991 prices)	22,300	18,725
Average household size (number of persons)	3	3
Average number of children	1	1
Percentage living or working in the area	16	18
Percentage on holiday	65	65
Average (one way) distance traveled from home, km	219	226
Percentage visiting for the first time	25	18
Average number of previous visits	11	10
Percentage staying on a boat	23	19
Percentage member of environmental group	45	35
n	1747	1108

Statistical testing procedures

- Comparison of mean WTP values (simple Student *t* or nonparametric M-W test)
- Comparison of WTP functions
  - Stability of variance
  - Stability of coefficient estimates
- Pooled regression
  - E.g. Downing and Ozuna, 1996 Carson et al., 1997
- Stepwise inclusion of additional control factors

Results

- Significantly lower average WTP in 1996 than in 1991
- Explained by income differences
- Models always transferable when pooling data (from 1991 to 1996 and vice versa) irrespective of model specification
- Simple models transferable based on both LR and Wald test
- Models non-transferable when including ad hoc variables

Table 2: Mean real WTP values from the 1991 and 1996 surveys (£ p.a. in 1991 prices) obtained from the parametric logistic model and (lower bound) non-parametric Turnbull model

	Parametric Linear-Logistic		Non-parametric Turnbull	
	1991	1996	1991	1996
Mean WTP (£)	248.1	215.8	54.2	37.8
Standard error	23.3	29.3	2.9	2.4
95% CI {1996 – 1991}	{-34.3 ; -30.3}		{-16.6 ; -16.2}	
Min-max values	-∞ - +∞	-∞ - +∞	0-200	0-200
N	1747	1108	1747	1108

Best fit multivariate linear-logit models for the 1991 and 1996 surveys

Explanatory factors	Value range[1]	1991 Prob (y_i = yes)	Value range[1]	1996 Prob (y_i = yes)
Constant		0.506		0.768 *
		(0.400)		(0.407)
Bid (the DC bid level presented to respondents)	1-500	-0.009 ***	1-412 [2]	-0.008 ***
		(0.0005)		(0.0008)
Income (Annual household income, £)	2500-62500	$0.249 * 10^{-4}$ ***	2060-51500 [2]	$0.193 * 10^{-4}$ **
		$(0.564 * 10^{-5})$		$(0.833 * 10^{-5})$
Size (number of persons in the household)	1-9	-0.143 **	1-12	-
		(0.056)		-
Distance (number of miles travelled to reach the site)	0-580	-0.002 ***	0-650	0.002 *
		(0.0007)		(0.001)
Visits (Number of previous visits p.a.)	0-305	0.009 **	0-356	-
		(0.004)		-
Scenic (appreciation of scenery)	1-4	0.513 ***	1-4	0.386 ***
		(0.112)		(0.108)
Holidaymaker (respondent was on holiday when interviewed)	0-1	-	0-1	-0.757 ***
		-		(0.269)
Log Likelihood		-705.9		-426.5
Likelihood Ratio Test (χ^2)		533.3 ($p<0.01$)		145.9 ($p<0.01$)
Pseudo R-square (%)		32.0		15.7
Predictive power (%)		80.8		81.9
N		1665		1015

[1] Minimum and maximum values.
[2] Corrected for inflation.
* Significant at 0.10
** Significant at 0.05
*** Significant at 0.01

Notes: Standard errors between brackets.

Table 3: Transfer test results from the DC CV models

		Model specification							
Transfer	Test	*Bid*	*Bid Income*	*Bid Income Distance*	*Bid Income Local*	*Bid Income Distance Scenery*	*Bid Income Local Scenery*	Best fit 1991	Best fit 1996
Transfer of the estimated 1991 models to 1996	Wald	0.93	3.71	9.70	3.51	13.20	5.88	20.50	15.03
	$\chi^2_{critical}$	5.99	7.81	9.45	9.49	11.07	11.07	14.07	12.59
	LR	0.58	2.19	6.19	2.07	7.97	3.23	11.49	10.40
	$\chi^2_{critical}$	5.99	7.81	9.45	9.49	11.07	11.07	14.07	12.59
Transfer of the estimated 1996 models to 1991	Wald	1.64	5.31	15.98	4.98	19.92	7.45	26.35	30.61
	$\chi^2_{critical}$	5.99	7.81	9.45	9.49	11.07	11.07	14.07	12.59
	LR	0.58	2.19	6.19	2.07	7.97	3.23	11.49	10.40
	$\chi^2_{critical}$	5.99	7.81	9.45	9.49	11.07	11.07	14.07	12.59

Note: Critical values at 5%.

= null hypothesis of model equality cannot be rejected (model is transferable)

Conclusions and recommendations

- Unadjusted WTP values non-transferable
- WTP functions transferable when including theoretically expected variables (income)
- Function approach always transferable when using less stringent conventional testing procedures (pooling/LR test)
- Significant differences in coefficients and variances when including ad hoc variables

Possible explanations for differences in residual variance of the two models

- Important explanatory variables that have been overlooked besides preferences and income:
- Changes in specific contextual conditions
- Changes in perceived feasibility of the proposed flood alleviation program